

VORTEX
THE FORCE OF OPTICS®

VIPER® HS-T™
RIFLESCOPE



RIFLESCOPE MANUAL

Second Focal Plane | MRAD

THE VORTEX[®] VIPER[®] HS-T[™] RIFLESCOPE

Specifically designed for the tactical, law enforcement and committed precision shooting communities, the Vortex[®] Viper[®] HS-T[™] riflescope offers the highest levels of performance and reliability. With features such as matched turret/reticle subtensions, CRS zero stop mechanisms and precision ranging reticles, the Viper HS-T is ready for any situation.



RETICLE OPTIONS

The Focal Plane

All riflescope reticles can be termed either first focal plane (FFP) or second focal plane (SFP), depending upon their internal location within the riflescope. This model features the second focal plane design.

Second Focal Plane Reticles

Second focal plane (SFP) reticles are located near the scope's eyepiece behind the image erecting and magnifying lenses. This style of reticle does not visually change in size when you change the magnification. The advantage of an SFP reticle is that it always maintains the same ideally-sized appearance when shooting with this SFP scope. Be aware that the listed reticle subtensions used for estimating range, holdover, and wind drift correction are only accurate at the highest magnification.

Warning

Looking directly at the sun through a riflescope, or any optical instrument, can cause severe and permanent damage to your eyesight.

RIFLESCOPE ADJUSTMENTS

Reticle Focus

The Viper HS-T riflescope uses a *fast focus* eyepiece designed to quickly and easily adjust the focus on the riflescope's reticle.

To adjust the reticle focus:

1. Look through the riflescope at a blank white wall or up at the sky.
2. Turn the eyepiece focus knob in or out until the reticle image is as crisp as possible.

Adjust the reticle focus



Note: Try to make this particular adjustment quickly, as the eye will try to compensate for an out-of-focus reticle.

Once this adjustment is complete, it will not be necessary to re-focus every time you use the riflescope. However, because your eyesight may change over time, you should re-check this adjustment periodically.

Variable Power Adjustments

To change the magnification, turn the magnification ring to the desired level. The Vortex fiber optic magnification indicator will provide a low light reference for magnification level.



Windage and Elevation Adjustments

The Viper HS-T riflescope incorporates precision finger adjustable elevation and windage dials with audible clicks.

To make adjustments:

1. Turn the adjustment knob in the appropriate direction: Up/Down or Left/Right as indicated by the arrows.
2. Following the directional arrows, turn the knobs in the direction you wish the bullet's point-of-impact to go to.



MRAD Adjustments

This Viper HS-T riflescope uses finger-adjustable elevation and windage turrets with scales measured in milliradians (mrads). MRADs are unit of arc measurements which equal 3.6 inches for each 100 yards. Examples: 7.2 inches @ 200 yards, 10.8 inches @ 300 yards, and so on.

Each click of the turret moves the point-of-impact .1 mrad for each 100 yards. For example, .1 mrad equals .36 inches at 100 yards, .72 inches at 200 yards, 1.08 inches at 300 yards, and so on.

Image Focus and Parallax Correction

The Viper HS-T riflescope features a side focus knob which should be used to fine-tune the image focus. When the image is sharply focused, parallax error will also be eliminated.

Using the Side Focus

1. Be sure the reticle is correctly focused (see **Reticle Focus** section on page 5).
2. Turn the side focus knob until the target image is as sharp as possible. The yardage numbers referenced on knob should closely match the actual yardage to the target.
3. Check for parallax error by moving your head back and forth while looking through the scope. The focus is correct if there is no apparent shift of the reticle on the target. If you notice any shift, adjust the focus knob slightly until all shift is eliminated.



Parallax is a phenomenon that results when the target image does not quite fall on the same optical plane as the reticle within the scope. This can cause an apparent movement of the reticle in relation to the target if the shooter's eye is off-centered. Correctly focusing the target image will allow it to fall on the same optical plane as the reticle within the riflescope.

Turret Rotation

The Viper HS-T riflescope incorporates Vortex's patented *Radius Bar* to visually assist in keeping track of turret rotations. The Radius Bar provides a quick visual reference that allows the shooter to confirm:

- Knob orientation is correct and has not shifted as a result of accidental contact.
- Knob orientation is at the zero point when using the CRS feature.
- By watching the position of the bar while making elevation adjustments, the shooter is able to quickly track full, half and quarter rotations.

To get these benefits from the Radius Bar, the "0" mark on the turret must be indexed with the zero reference line on turret post (see **Setting the CRS Stop and Indexing Elevation Knob** section on page 14).



Customizable Rotational Stop (CRS)

Viper HS-T riflescope elevation turrets incorporate the unique **CRS** rotation stop feature. After the rifle is sighted in, the design of the CRS allows a shooter to quickly and easily return to an original zero point when using the elevation turret to dial-in temporary bullet drop corrections.

The CRS feature is particularly useful when dialing large multi-revolution elevation corrections. Without this feature, the shooter must pay very careful attention when dialing these large corrections. If the shooter loses track of the number of revolutions, the original zero point may become lost when returning the adjustment. The CRS allows the elevation dial to be quickly spun back to original zero without having to carefully count revolutions or clicks.

Once the CRS shims are installed after sight-in, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment. The shooter can then turn the elevation knob a partial turn in a counter-clockwise direction until the zero reference and radius bar are correctly aligned—achieving the original zero point.

See CRS shim installation in the **Bore Sighting and Final Range Sight-in** sections.



CRS Shims

RIFLESCOPE MOUNTING

To get the best performance from your Viper HS-T riflescope, proper mounting is essential.

Although not difficult, the correct steps must be followed. If you are unsure of your abilities, it would be best to use the services of a qualified gunsmith.



Rings and Bases

Mount an appropriate base and matching rings to your rifle according to the manufacturer's instructions. The Viper HS-T riflescope requires 30 mm rings.

Use the lowest ring height that will provide complete clearance of scope and rifle—avoiding any contact with barrel, receiver, bolt handle or any other part of the rifle. A low mounting height will help assure proper cheek weld, aid in establishing a solid shooting position, and promote fast target acquisition.

Eye Relief and Reticle Alignment

After installing the bottom ring halves on the mounting base, place the riflescope on the bottom ring halves and loosely install the upper ring halves. Before tightening the scope ring screws, adjust for maximum eye relief to avoid injury from recoil:

1. Set the riflescope to the middle of its magnification range.
2. Slide the riflescope as far forward as possible in the rings.
3. While viewing through the riflescope in a normal shooting position, slowly slide the riflescope back towards the shooter's face—paying attention to the field of view. *Just as the full view is visible, stop.*
4. Without disturbing the front-back placement, rotate the riflescope until the vertical crosshair exactly matches the vertical axis of the rifle. Use of a reticle leveling tool, a weight hung on a rope, flat feeler gauges, or bubble levels will help with this procedure.
5. After aligning the reticle, tighten and torque the ring screws down per the manufacturer's instructions.



Using bubble levels to square the riflescope to the base.

Bore Sighting

Initial bore sighting of the riflescope will save time and money at the range. This can be done by using a mechanical or laser bore sighter according to the manufacturer's instructions or by removing the bolt and sighting through the barrel on some rifles.

To visually bore sight a rifle:

1. Place the rifle solidly on a rest and remove the bolt.
2. Sight through the bore at a target approximately 100 yards away.
3. Move the rifle and rest until the target is visually centered inside the barrel.
4. With the target centered in the bore, make windage and elevation adjustments until the reticle crosshair is also centered over the target.



Visually bore-sighting a rifle.

Final Range Sight-In and CRS Stop Set

After the riflescope has been bore-sighted, final sight-in and CRS stop set should be done at the range using the exact ammunition expected to be used while shooting. Sight in and zero the riflescope at the preferred distance. 100 yards is the most common zero distance, although a 200 yard zero may be preferred for long range applications.

Be sure the reticle is in focus (see **Reticle Focus** section on page 5) and adjust the side focus knob if present until the target image is sharp and without parallax error (see **Using the Side Focus** section on page 7).

1. Following all safe shooting practices, fire a three-shot group as precisely as possible.
2. Next, adjust the reticle to match the approximate center of the shot group (see **Windage and Elevation Adjustment** section on page 6).

Note: If the rifle is very solidly mounted and cannot be moved, simply look through the scope and adjust the reticle until it is centered on the fired group.

3. Carefully fire another three-shot group and see if the bullet group is centered on the bullseye.

This procedure can be repeated as many times as necessary to achieve a perfect zero.

Setting the CRS Stop and Indexing Elevation Knob

After obtaining a satisfactory zero, the CRS stop can be set if desired:

1. Loosen the three turret cap retaining screws on the elevation turret. Gently pull the turret cap straight up and off of the turret post, being careful not to rotate the turret post.
2. Slide the CRS shims on the center section of the turret post below the V-grooved part.



Alternate shim installation direction with each shim.

Use as many shims as necessary to completely fill up the space. Do not try to force in a last shim once the clearance is very close—a tiny remaining gap is normal.



3. After filling the center gap on the post with shims, replace the elevation cap.
4. Align the turret cap so the “0” mark on the cap matches up with the “0” reference line on the turret post. Again, be sure not to rotate the actual turret mechanism in the process.
5. Re-tighten the retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force.



Align the elevation turret cap.

Indexing the Windage Knob

1. Loosen the three retaining screws on windage turret cap.
2. Carefully rotate the cap until the “0” mark on the cap matches up with the “0” reference line on the turret post. Be sure that the cap is freely turning and that you don’t rotate the actual turret mechanism.
3. Re-tighten the windage knob retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force.

Once the windage and elevation knobs are correctly indexed to the zero mark, temporary corrections can be safely dialed into the scope without worry of losing the original zero.



Align the windage turret cap.

Using the CRS Zero Stop

Once the CRS shims are installed, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment.

Turn the elevation knob a partial turn in a counter-clockwise direction until the Radius Bar is correctly aligned with scope axis and zero marks match. This setting will match the original zero point.

Note: If re-zeroing at a future time, be sure to remove all CRS shims before sight-in.



Point at which the knob stops turning.



Correct alignment for zero point.

MAINTENANCE

Cleaning

The fully waterproof and fogproof Viper HS-T riflescope requires very little routine maintenance other than periodically cleaning the exterior lenses. The exterior of the scope may be cleaned by wiping with a soft, dry cloth.

When cleaning the lenses, be sure to use products, such as the Vortex Fog Free cleaning products or LensPen, that are specifically designed for use on coated optical lenses.

- Be sure to blow away any dust or grit on the lenses prior to wiping the surfaces.
- Using your breath, or a very small amount of water or pure alcohol, can help remove stubborn things like dried water spots.

Lubrication

All components of the Viper HS-T riflescope are permanently lubricated, so no additional lubricant should be applied.

Note: Other than removing the turret caps, do not attempt to disassemble any components of the riflescope. Disassembling of the riflescope may void the warranty.

Storage

If possible, avoid exposing your Vortex riflescope to direct sunlight or any very hot location for long periods of time.

TROUBLESHOOTING

Sighting-in Problems

Many times, problems thought to be with the scope are actually mount problems. Be sure that correct base and rings are being used in the correct orientation, and that the base screws and rings are tight. Insufficient windage or elevation adjustment range may indicate problems with rings, base, base alignment, base mount holes drilled in the rifle's receiver, or barrel/receiver alignment.

Check for Correct Base and Ring Alignment

- Roughly center the reticle by adjusting both windage and elevation turrets to the mid point of their travel ranges.
- Attach bore sighter, or remove bolt and visually boresight rifle.
- Look through the scope. If the reticle appears way off center on the boresighter image or when compared to the visually centered target when looking through rifle's bore, there may be a problem with the bases or rings being used. Confirm that correct base and rings are being used—and in the proper orientation.

Tips for Solving Bullet Grouping Problems

- Maintain a good shooting technique and use a solid rest.
- Check that all screws on rifle's action are properly tightened.
- Be sure rifle barrel and action are clean and free of excessive oil or copper fouling.
- Check that rings are correctly torqued per the manufacturer's instructions.
- Some rifles and ammunition don't work well together—try different ammunition and see if accuracy improves.

THE VIP WARRANTY

We build optics based on our commitment to your absolute satisfaction. That's why Vortex products are unconditionally guaranteed and we make this Very Important Promise to you—a Very Important Person.

Rest assured that in the event your Viper HS-T becomes damaged or defective, Vortex Optics will repair or replace the riflescope at no charge to you. Call Vortex Optics at 800-426-0048 for prompt, professional, and friendly service.



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Visit www.vortexoptics.com for more information. Canadian customers may visit www.vortexcanada.net for customer service information.

Note: The VIP warranty does not cover theft, loss, or deliberate damage to the product.

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